A series of papers on the metabolism of amino-acids in the organism is contributed by Dr. U. Lombroso and his collaborators (vol. xxiv., i., 148, 475, 863, and 870). Dr. A. Clementi (vol. xxiv., i., 972) has studied the action of proteoclastic enzymes on polypeptides, and (vol. xxiv., i., 55) the introduction of the guanidine nucleus into the molecule of polypeptides and its significance in physiology.

Amongst papers in pure organic chemistry, the following may be mentioned. E. Sernagiotto has studied in detail *carvone camphor*, a substance formed by the isomeric change of carvone when exposed to light in aqueous alcoholic solution. A. Angeli deals with the properties of certain azoxyphenols and of certain aldehydic compounds, V. Paolini and L. Devizia with the isomeric linalools and the resolution of the inactive form into its optically active components. L. Mascarelli and F. Negrisoli describe the resolution of decahydroquinoline into its optical antipodes.

In inorganic chemistry, Dr. G. Ponti describes investigations of the exhalations from Mount Etna; L. Cambi and G. Sperone have studied the properties of calcium amalgam and give measurements of its electromotive force. The electromotive force of magnesium amalgam forms the subject of a separate paper by L. Cambi.

In physics, A. Lo Surdo has studied the electrical field in the Hittorf-Crookes space, and the electrical decomposition of spectral lines. A. Venturi gives measurements of gravity carried out in Sicily in 1910, and U. Cisotti contributes a mathematical study of new types of permanent periodic and rotational waves. G. C. Trabacchi deals with the Hall effect in alloys of tellurium and bismuth, and P. Cardani describes a method of stabilising the action of Röntgen tubes by absorption of the carbon dioxide.

In the biological sciences, B. Grassi deals with phylloxera, G. Tizzoni with the significance of polymorphism in identifying the streptobacillus of pellagra, and R. Perotti with the morphological variation of *Mycoderma vini*.

W. A. D.

PHYSIOLOGY AT THE BRITISH ASSOCIATION.

AFTER the president's address the reports of several research committees were received. Prof. Waller demonstrated a small apparatus he had devised for the convenient administration of known percentages of chloroform. The regulation of the dose is easily effected, and anæsthesia may be safely induced by the patient himself, the mask falling off the face when the patient is sufficiently under chloroform.

In the report of the committee investigating the electromotive phenomena of plants Prof. Waller described an electrical method of testing the vitality of seeds. The size of the electrical response is directly proportional to the amount of vitality. The method is a great improvement upon existing methods, and should prove of commercial value in the testing of seeds.

Prof. Moore gave a paper on the action of light upon certain inorganic and organic substances. He reviewed the action of chlorophyll in photosynthesis, and showed how similar action could be obtained by the use of inorganic salts in place of chlorophyll. Prof. Moore found that acid salts, and especially iron salts, are most effective, the action being greatest when the colloidal surface is at a maximum. Chlorophyll itself is not the essential element in photosynthesis, but the colloidal salts in the chloroplast. Iron salts are abundant in many of the lower plants, and enable these to make use of the action of light.

Dr. T. W. Edridge-Green, in a communication entitled "Some Fundamental Facts of Vision and Colour Vision," attacked the prevalent assumptions that the rods of the retina are percipient elements, and that there are fundamental colour sensations which by their mixture give rise to other colour sensations. He adduced a number of arguments which he considered destructive of these theories.

Dr. T. W. Graham Brown then illustrated by lantern slides the effects of removal of the post-central gyrus of both sides of the brain upon the movements of a chimpanzee. Shortly after operation the chimpanzee was able to swing from the bars of the cage, using either hand with no sign of inco-ordination. A month after operation the animal showed no symptoms, was able to choose the right key from a bunch, insert it in the keyhole, and unlock and open the door of its room.

Prof. Herring described the effects of thyroidectomy and thyroid-feeding upon the adrenin content of the suprarenals. The adrenin was tested by the action of extracts of the suprarenals upon the blood-pressure of pithed cats after the method employed by Elliott. In a further series the amount of adrenin was measured by Folin's colorimetric process, and expressed in amount per kilo. body-weight. Thyroidectomy reduced the adrenin content considerably, but, when compared with the adrenin content of control animals similarly operated on except for the thyroids being left, it was found there was little difference. In animals which tolerate thyroidectomy, *e.g.* rabbits, there was little difference between the adrenin contents of thyroidectomised and control operated-upon animals a month after operation. Thyroid-feeding, on the other hand, in every case increased the adrenin content above that of the normal animal, and extracts of the suprarenals from thyroid-fed animals gave greater effects upon blood-pressure than similarly prepared extracts from the suprarenals of normal animals.

On Thursday Prof. Bayliss opened the day's proceedings by a paper on "The Mode of Action of Urease." He finds that urease is active in solutions in which it is insoluble, *e.g.* strong alcohol, and therefore acts at its surface by adsorbing urea. Water increases the rate of reaction by mass action or by the intervention of molecular forces in the act of condensation. On this assumption the action of various substances on the rate of reaction may be explained in two ways. The one action changes the degree of colloidal dispersion, and so alters the extent of active surface. Electrolytes show this action either by increasing dispersion and so accelerating the reaction, or by decreasing the surface by aggregation or incipient precipitation and so retarding the reaction. Weak acid and phosphate accelerate the reaction by increasing dispersion; multivalent ions, such as lanthanum, retard the reaction. The other effect may be explained by the substance taking possession of the surface and displacing the urea from it. This is shown by the so-called "surface-active" substances such as amyl alcohol, bile salts, and saponin. Surface energy is depressed and has a negative temperature-coefficient, and Prof. Bayliss finds that the retardation of reaction is greater at low than at higher temperatures. Adsorption of urea by the urease also explains the ratio existing between the concentration of the enzyme and its activity, together with the constancy of the rate of reaction above a certain concentration of the substrate, the latter being due to saturation of the surface. Concentrated solutions of urea greatly retard the action of urease and other enzymes. This is not explained by viscosity or want of water, but is

© 1915 Nature Publishing Group

probably due to some action related to the solvent properties of urea. All attempts at synthesis of urea by urease failed. Prof. Bayliss referred to the complexity of the process of hydrolysis of urea, and believes that the first action of urease on urea is to form ammonium cyanate. The change of ammonium carbamate to carbonate is not accelerated by urease. An interesting discussion of problems raised by the paper followed, in which Prof. Ramsden and Prof. Moore took part.

Dr. J. Tait gave a communication on capillary phenomena in blood cells, and on phagocytosis. He described the movement of the spindle-shaped cells of invertebrate blood in coagulation, and pointed out their analogies with blood platelets. Such cells are phagocytic, but not amœboid; their movement is irreversible and passes into cytolysis. Dr. Tait proposes the name "Thigmocyte" for this class of blood cell. If the thigmocyte is unstable for any substance it is phagocytic for that substance. The movement may be explained physically, and obeys the laws of capillary attraction. Leucocytes, on the other hand, may be stable on a foreign substance, and yet be capable of ingesting small fragments of that substance. Dr. Tait showed that this is not inconsistent with a physical explanation. He further proposed a physical explanation for various blood phenomena, amœboid movement, diapedesis, the relation between agglutinins and opsonins, and the coagulation of blood.

Dr. C. E. Lea showed lantern slides of electrocardiograph records from clinical cases of auricular fibrillation of the heart, and pointed out the value of this method as a mode of diagnosis. The action of drugs on the condition was also illustrated.

Dr. E. P. Poulton read a paper on the alleged acid intoxication of diabetic coma. He analysed a series of cases showing the amount of alveolar CO_2 and the hydrogen-ion in the blood. Dr. Poulton finds no evidence of acid intoxication in diabetic coma; the blood, indeed, shows no increase in H-ion concentration in this condition, and is less acid than in uræmia, or even after moderate exercise. He believes the coma of diabetes to be the direct action of some poison, possibly acetoacetic acid. The lowering of the alveolar CO_2 may be to some extent responsible, and is in itself a trustworthy index to the onset of the condition.

Prof. W. H. Thompson recorded some experiments upon arginine and the formation of creatine. He 'ed or injected dogs and ducks with arginine, and estimated the output of creatine. In nearly all cases there was an increase of the creatine-creatinine output, injection giving the higher result. Racemic arginine gave no greater effect than dextro-arginine.

Prof. Thompson also contributed a paper on the effects of tetanisation on the creatine and creatinine in the muscle of the cat. A decerebrate animal was used and the creatine estimated by Folin's method. There was an apparent decrease as the result of long-continued activity of the muscle, but Prof. Thompson did not believe there was any real alteration, the apparent decrease being explained by other factors.

On Friday Dr. C. Powell White described a test for copper sufficiently delicate to detect 1/100th of a milligram in 15 c.c. of fluid. The test is identical with Oliver's test for morphine. Dr. Powell White found copper in all the tissues of the body and in various foodstuffs, animal and vegetable. Quantitative measurements were made by the ferrocyanide method. The copper may possibly play an important part in the reactions taking place in the living cell.

Dr. Lamb and Mr. Holker reviewed a number of methods of differentiating fats and lipoids microchemically, and showed lantern slides of tissues thus treated.

Dr. Lamb also illustrated the appearances of the mucous membrane of the small intestine during fat absorption, and showed differences in the columnar cells according to the kind of fat that was administered.

Dr. Sarah M. Baker propounded a new theory of muscular contraction which she termed the "liquid pressure theory." The theory was arrived at in consequence of a similar explanation of the ascent of sap in trees. An aeropermeable membrane, impermeable to liquids but permeable to gases, is assumed to be present in muscle. Carbohydrate is oxidised in the muscle with the production of water and CO_2. The formation of water causes a liquid pressure which manifests itself as a contraction of the muscle. Relaxation is due to rapid evaporation of water through the membrane. The heat thus lost reduces the total energy of the oxidation process by about nine per cent. Dr. Baker cited a number of observations supporting various points in the theory. In the discussion that followed, Prof. Thompson and Prof. Herring criticised the application of this theory to muscle in several details, and Dr. Baker replied.

Dr. Tait and Dr. Harold Pringle then gave a paper on the elasticity of the strophanthinised heart. Tracings of an isolated frog ventricle in Schäfer's plethysmograph were exhibited by the lantern, and the action on it of strophanthin demonstrated. The amount of relaxation of the ventricle was shown to be directly proportional to the preceding contraction, and to be entirely due to the elasticity of the heart.

BOTANY AT THE BRITISH ASSOCIATION.

THE meeting this year was a busy and successful one, though the attendance was smaller than it would have been in happier circumstances, many members being prevented from attending by more urgent calls and duties.

The shadows cast over the meeting by the war were deepened for Section K by the news of the premature death of Prof. D. T. Gwynne-Vaughan, who had been for many years successively secretary and recorder of the section. On Wednesday morning the section adjourned as a mark of respect during the hour of the funeral. A new departure which proved of value scientifically was the setting apart of an afternoon in which readers of papers demonstrated their results, and others also gave demonstrations. It afforded an opportunity for informal discussion which was greatly appreciated. No sectional dinner or excursions were arranged.

The presidential address has already been given in an abridged form in these pages. It embodied a plea for the revival of the causal point of view in morphology, so long neglected in favour of the phyletic aim. Using the alternating generations of the fern, the seed and its embryo, and other examples, the president illustrated the application of distinctively morphological conceptions, such as specific substance, with "allotropic" forms, and the correlation or mutual influence of parts, to the study of form and structure, and emphasised the significance for causal morphology of "homologies of organisation," which have been the bugbear of phyletic morphology.

A feature of the meeting very appropriate in Manchester was a lecture by Mr. Lawrence Balls on the application of science to the cotton industry. Surveying the chief results of his experimental study of the cotton plant in Egypt, he showed how, by suitable sampling, trustworthy statistics could be obtained, from which the growth, flowering, and fruiting of an average plant under average conditions could be cal-

© 1915 Nature Publishing Group